



Acta Crystallographica Section E

Structure Reports

Online

ISSN 1600-5368

Cs₅Sn₉(OH)·4NH₃

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Received 25 April 2014; accepted 21 May 2014

Key indicators: single-crystal X-ray study; $T = 123$ K; mean $\sigma(I) = 0.000$ Å; R factor = 0.020; wR factor = 0.037; data-to-parameter ratio = 30.9.

The title compound, pentacaesium nonastannide hydroxide tetraammonia, crystallized from a solution of CsSnBi in liquid ammonia. The Sn_9^{4-} unit forms a monocapped quadratic antiprism. The hydroxide ion is surrounded by five caesium cations, which form a distorted quadratic pyramidal polyhedron. A three-dimensional network is formed by Cs—Sn [3.8881 (7) Å to 4.5284 (7) Å] and Cs—NH₃ [3.276 (7)–3.636 (7) Å] contacts.

Related literature

For the co-crystallization of Zintl anions and oxide or hydroxide ions see, for example: Boss *et al.* (2005), Röhr (1995) For the diagonal ratio value of the Sn_9^{4-} anion, see: Fässler & Hoffmann (1999).

Experimental

Crystal data

Cs₅Sn₉(OH)·4NH₃ $M_r = 1817.90$ Orthorhombic, $P2_12_12_1$ $a = 10.0935$ (1) Å $b = 14.8256$ (2) Å $c = 20.0419$ (3) Å $V = 2999.11$ (7) Å³ $Z = 4$ Mo $K\alpha$ radiation $\mu = 13.34$ mm^{−1} $T = 123$ K $0.32 \times 0.15 \times 0.06$ mm

Data collection

Agilent SuperNova (single source at
offset, Eos) diffractometerAbsorption correction: multi-scan
(*CrysAlis PRO*; Agilent, 2012) $T_{\min} = 0.263$, $T_{\max} = 1.000$

34752 measured reflections

5910 independent reflections

5754 reflections with $I > 2\sigma(I)$ $R_{\text{int}} = 0.045$

Refinement

 $R[F^2 > 2\sigma(F^2)] = 0.020$ $wR(F^2) = 0.037$ $S = 1.05$

5910 reflections

191 parameters

H-atom parameters constrained

 $\Delta\rho_{\max} = 0.69$ e Å^{−3} $\Delta\rho_{\min} = -0.61$ e Å^{−3}Absolute structure: Flack x determined using 2458 quotients
[[I^-)-(I^-)]/[I^-)+(I^-)] (Parsons
& Flack, 2004)Absolute structure parameter:
0.037 (17)

Data collection: *CrysAlis PRO* (Agilent, 2012); cell refinement: *CrysAlis PRO*; data reduction: *CrysAlis PRO*; program(s) used to solve structure: *OLEX2.SOLVE* (Bourhis *et al.*, 2014); program(s) used to refine structure: *SHELXL2013* (Sheldrick, 2008); molecular graphics: *DIAMOND* (Brandenburg & Putz, 2011); software used to prepare material for publication: *OLEX2* (Dolomanov *et al.*, 2009).

UF thanks the Chemical Industry Fund for a scholarship.

Supporting information for this paper is available from the IUCr electronic archives (Reference: RU2058).

References

- Agilent (2012). *CrysAlis PRO*. Agilent Technologies, Yarnton, England.
Boss, M., Petri, D., Pickhard, F., Zönnchen, P. & Röhr, C. (2005). *Z. Anorg. Allg. Chem.* **631**, 1181–1190.
Bourhis, L. J., Dolomanov, O. V., Gildea, R. J., Howard, J. A. K. & Puschmann, H. (2014). In preparation.
Brandenburg, K. & Putz, H. (2011). *DIAMOND*. Crystal Impact, Bonn, Germany.
Dolomanov, O. V., Bourhis, L. J., Gildea, R. J., Howard, J. A. K. & Puschmann, H. (2009). *J. Appl. Cryst.* **42**, 339–341.
Fässler, T. F. & Hoffmann, R. (1999). *Dalton Trans.* **19**, 3339–3340.
Parsons, S. & Flack, H. (2004). *Acta Cryst.* **A60**, s61.
Röhr, C. (1995). *Z. Naturforsch. Teil B*, **50**, 802–808.
Sheldrick, G. M. (2008). *Acta Cryst.* **A64**, 112–122.

supplementary materials

Acta Cryst. (2014). E70, i29 [doi:10.1107/S1600536814011817]

Cs₅Sn₉(OH)·4NH₃

Ute Friedrich and Nikolaus Korber

1. Comment

The crystal structure of Cs₅Sn₉(OH) × 4 NH₃ was determined in the course of solvation experiments on ternary alkali metal–Sn–Bi-phases.

The Sn₉^{4−} anion has a diagonal ratio value (Fässler *et al.*, 1999) which is very close to 1, consequently it can be described as a monocapped quadratic antiprism (Fig. 1). Sn—Sn bond lengths range from 2.9310 (8) Å to 3.2457 (8) Å. The nonastannid cluster is surrounded by 15 caesium cations with distances ranging from 3.8881 (7) Å to 4.5284 (7) Å. The chemical origin of the hydroxide anion could not be determined, but it is likely that water was introduced to the system, which was deprotonated by the ammonia solvent. The caesium cations form a distorted quadratic pyramide around the hydroxide ion (Fig. 1). The distances $d_{\text{Cs}—\text{O}}$ have values between 2.818 (5) Å and 3.080 (6) Å. Angles between neighbouring equatorial cations Cs_{eq}—O(1)—Cs_{eq} range from 86.43 (13)° to 95.28 (17)°, angles between the axial and the equatorial Cs cations Cs_{ax}—O(1)—Cs_{eq} have values between 85.15 (15)° and 101.89 (16)°. The ammonia molecules coordinate with distances from 3.276 (7) Å to 3.636 (7) Å to the caesium cations, forming a three dimensional network (Fig. 2).

2. Experimental

The educt material CsSnBi was synthesized in glas ampoules at 723 K from stoichiometric amounts of the corresponding elements. 0.35 g (0.38 mmol) CsSnBi were weighed in a baked out reaction vessel, afterwards 10 ml of ammonia were condensed, leading to a brownish red solution. The solution was stored for four months at 236 K. The title compound formed as red plate-shaped crystals.

3. Refinement

The H atoms of the ammonia molecules and the hydrogen atom of the hydroxide ion were positioned with idealized geometry and refined isotropically with $U_{\text{iso}}(\text{H}) = 1.2 U_{\text{eq}}(\text{O})$ and $U_{\text{iso}}(\text{H}) = 1.5 U_{\text{eq}}(\text{N})$ using a riding model. For a chemically reasonable alignment of the hydrogen atoms of three ammonia molecules dummy atoms were used. The hydrogen atom of the hydroxide anion was placed in elongation of the Cs(5)—O(1) axes with the HFIX 163 command.

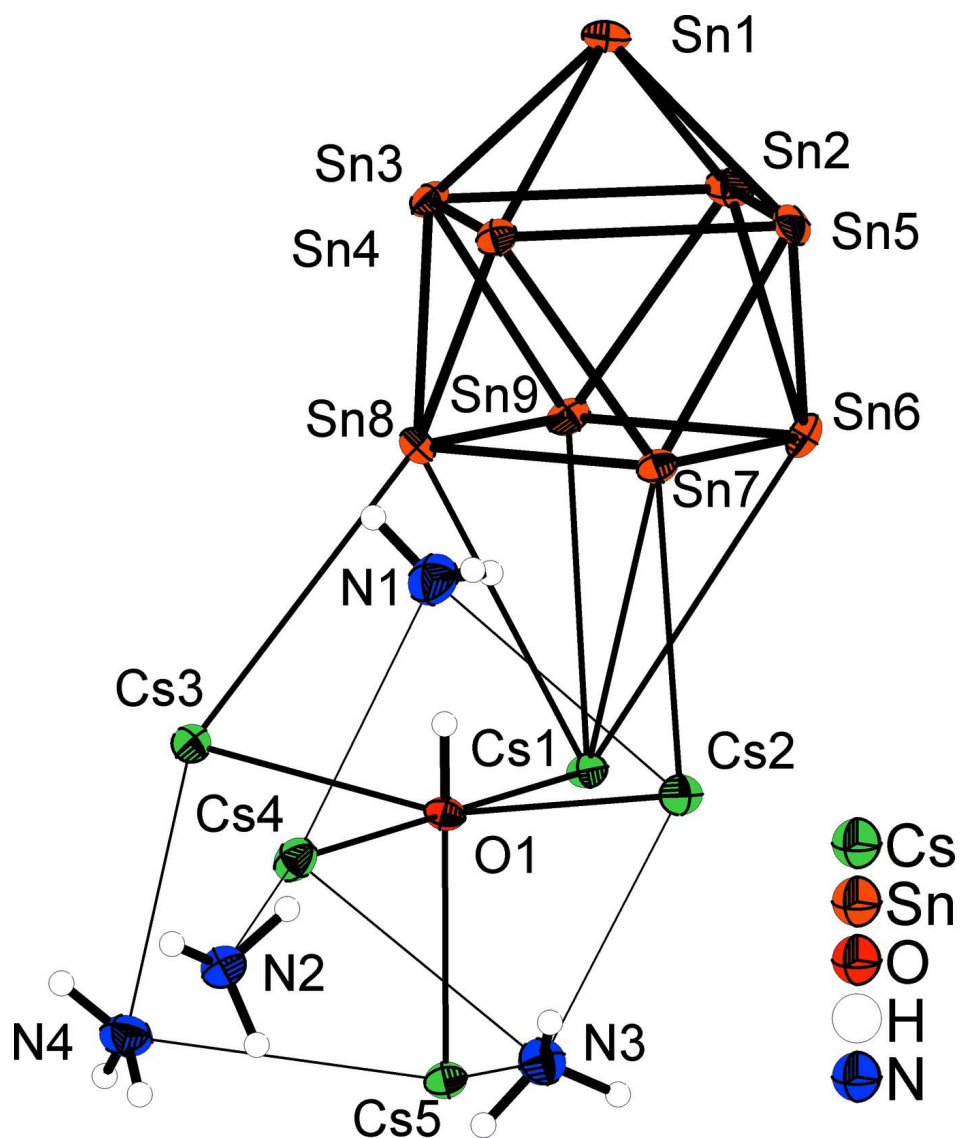
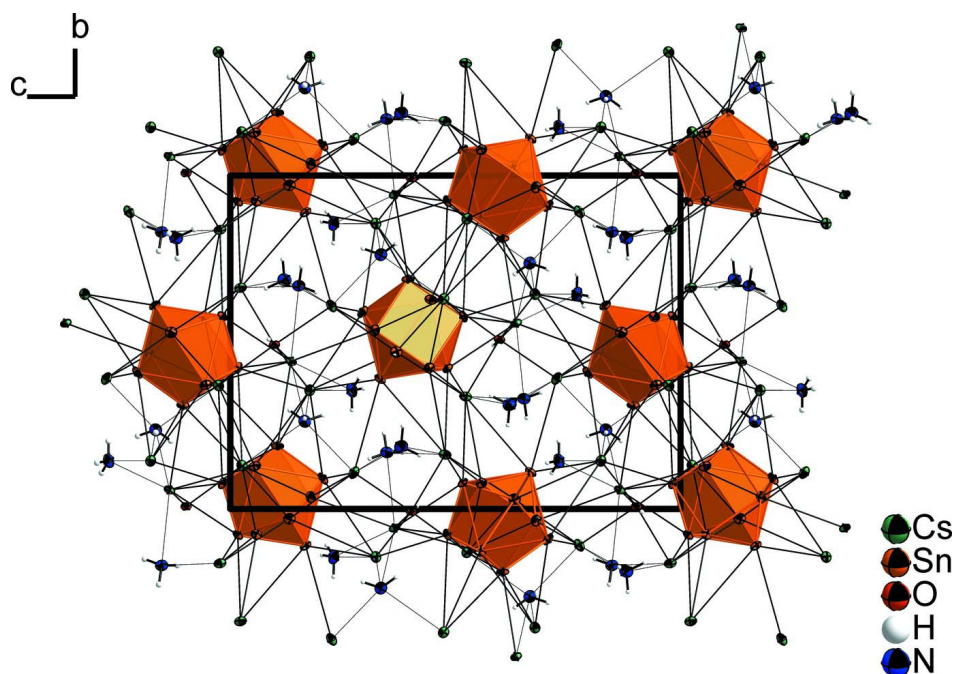


Figure 1

Asymmetric unit of the title compound; displacement ellipsoids drawn at the 50% probability level.

**Figure 2**

Projection of the unit cell along the crystallographic *a*-axis; displacement ellipsoids drawn at the 50% probability level.

Pentacaesium nonastannide hydroxide tetraammonia

Crystal data

$\text{Cs}_5\text{Sn}_9(\text{OH})\cdot 4\text{NH}_3$

$M_r = 1817.90$

Orthorhombic, $P2_12_12_1$

$a = 10.0935 (1) \text{ \AA}$

$b = 14.8256 (2) \text{ \AA}$

$c = 20.0419 (3) \text{ \AA}$

$V = 2999.11 (7) \text{ \AA}^3$

$Z = 4$

$F(000) = 3096$

$D_x = 4.026 \text{ Mg m}^{-3}$

Mo $K\alpha$ radiation, $\lambda = 0.71073 \text{ \AA}$

Cell parameters from 21366 reflections

$\theta = 2.9\text{--}28.8^\circ$

$\mu = 13.34 \text{ mm}^{-1}$

$T = 123 \text{ K}$

Plate, red

$0.32 \times 0.15 \times 0.06 \text{ mm}$

Data collection

Agilent SuperNova (single source at offset, Eos) diffractometer

Radiation source: SuperNova (Mo) X-ray

Source

Detector resolution: $7.9851 \text{ pixels mm}^{-1}$

ω scans

Absorption correction: multi-scan

(*CrysAlis PRO*; Agilent, 2012)

$T_{\min} = 0.263$, $T_{\max} = 1.000$

34752 measured reflections

5910 independent reflections

5754 reflections with $I > 2\sigma(I)$

$R_{\text{int}} = 0.045$

$\theta_{\max} = 26.0^\circ$, $\theta_{\min} = 2.9^\circ$

$h = -12 \rightarrow 12$

$k = -18 \rightarrow 18$

$l = -24 \rightarrow 24$

Refinement

Refinement on F^2

Least-squares matrix: full

$R[F^2 > 2\sigma(F^2)] = 0.020$

$wR(F^2) = 0.037$

$S = 1.05$

5910 reflections

191 parameters

0 restraints

Hydrogen site location: inferred from
neighbouring sites
H-atom parameters constrained
 $w = 1/[\sigma^2(F_o^2) + (0.0119P)^2 + 0.8162P]$
where $P = (F_o^2 + 2F_c^2)/3$
 $(\Delta/\sigma)_{\max} = 0.002$

$\Delta\rho_{\max} = 0.69 \text{ e } \text{\AA}^{-3}$
 $\Delta\rho_{\min} = -0.61 \text{ e } \text{\AA}^{-3}$
Absolute structure: Flack x determined using
2458 quotients $[(I^+)-(I^-)]/[(I^+)+(I^-)]$ (Parsons &
Flack, 2004)
Absolute structure parameter: 0.037 (17)

Special details

Experimental. crystal mounting in perfluorether

Absorption correction: CrysAlisPro (Agilent Technologies, 2012), Empirical absorption correction using spherical harmonics, implemented in SCALE3 ABSPACK scaling algorithm.

Geometry. All e.s.d.'s (except the e.s.d. in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell e.s.d.'s are taken into account individually in the estimation of e.s.d.'s in distances, angles and torsion angles; correlations between e.s.d.'s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell e.s.d.'s is used for estimating e.s.d.'s involving l.s. planes.

Refinement. Refinement of F^2 against ALL reflections. The weighted R -factor wR and goodness of fit S are based on F^2 , conventional R -factors R are based on F , with F set to zero for negative F^2 . The threshold expression of $F^2 > \sigma(F^2)$ is used only for calculating R -factors(gt) *etc.* and is not relevant to the choice of reflections for refinement. R -factors based on F^2 are statistically about twice as large as those based on F , and R -factors based on ALL data will be even larger.

Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (\AA^2)

	<i>x</i>	<i>y</i>	<i>z</i>	$U_{\text{iso}}^*/U_{\text{eq}}$
Cs1	0.69651 (4)	0.62993 (3)	0.52616 (3)	0.01745 (12)
Cs5	0.96022 (5)	0.55715 (3)	0.36506 (3)	0.01733 (12)
Cs2	0.77685 (5)	0.33699 (3)	0.47723 (3)	0.01964 (13)
Cs3	0.53343 (5)	0.64420 (3)	0.32331 (3)	0.01897 (12)
Cs4	0.70495 (5)	0.39111 (4)	0.27494 (3)	0.02169 (13)
Sn8	0.32179 (5)	0.57700 (4)	0.48243 (3)	0.01753 (13)
Sn9	0.33484 (5)	0.68860 (4)	0.60507 (3)	0.01726 (14)
Sn6	0.44704 (5)	0.53549 (4)	0.67889 (3)	0.01920 (14)
Sn4	0.15595 (5)	0.42149 (4)	0.51683 (3)	0.01634 (13)
Sn5	0.24692 (5)	0.38957 (4)	0.66732 (3)	0.01944 (14)
Sn3	0.07763 (5)	0.62769 (4)	0.55430 (3)	0.01715 (14)
Sn2	0.17196 (6)	0.59083 (4)	0.70575 (3)	0.02052 (14)
Sn7	0.43672 (5)	0.42314 (4)	0.55797 (3)	0.01669 (13)
Sn1	−0.00956 (5)	0.47064 (4)	0.63144 (3)	0.01970 (14)
O1	0.7008 (5)	0.5080 (3)	0.4020 (3)	0.0160 (13)
H1	0.6133	0.4914	0.4145	0.019*
N4	0.8001 (7)	0.6444 (5)	0.2302 (4)	0.0272 (19)
H4A	0.8659	0.6084	0.2143	0.041*
H4B	0.8275	0.7029	0.2296	0.041*
H4C	0.7269	0.6384	0.2041	0.041*
N3	0.9939 (7)	0.3306 (4)	0.3478 (4)	0.0249 (19)
H3A	1.0352	0.3496	0.3100	0.037*
H3B	0.9629	0.2735	0.3416	0.037*
H3C	1.0524	0.3310	0.3823	0.037*
N2	0.7994 (6)	0.2374 (4)	0.1655 (4)	0.0237 (18)
H2A	0.7623	0.2044	0.1321	0.036*
H2B	0.7658	0.2189	0.2054	0.036*
H2C	0.8888	0.2293	0.1653	0.036*

N1	0.4815 (7)	0.3126 (5)	0.3796 (4)	0.031 (2)
H1A	0.4909	0.2518	0.3834	0.046*
H1B	0.3990	0.3256	0.3640	0.046*
H1C	0.4929	0.3388	0.4202	0.046*

Atomic displacement parameters (\AA^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Cs1	0.0134 (2)	0.0200 (3)	0.0189 (3)	−0.0008 (2)	0.0009 (2)	−0.0020 (2)
Cs5	0.0155 (2)	0.0163 (3)	0.0202 (3)	−0.0019 (2)	−0.0001 (2)	−0.0021 (2)
Cs2	0.0186 (3)	0.0152 (2)	0.0251 (4)	0.0012 (2)	0.0014 (2)	0.0016 (2)
Cs3	0.0175 (2)	0.0210 (3)	0.0185 (3)	0.0007 (2)	−0.0004 (2)	0.0003 (2)
Cs4	0.0192 (3)	0.0264 (3)	0.0194 (3)	0.0021 (2)	−0.0026 (2)	−0.0053 (2)
Sn8	0.0175 (3)	0.0204 (3)	0.0146 (4)	−0.0020 (2)	0.0026 (3)	0.0044 (3)
Sn9	0.0146 (3)	0.0119 (3)	0.0253 (4)	−0.0024 (2)	−0.0030 (3)	−0.0010 (3)
Sn6	0.0169 (3)	0.0215 (3)	0.0192 (4)	0.0014 (2)	−0.0077 (3)	−0.0012 (3)
Sn4	0.0154 (3)	0.0157 (3)	0.0179 (4)	−0.0031 (2)	−0.0020 (3)	−0.0035 (3)
Sn5	0.0221 (3)	0.0161 (3)	0.0201 (4)	0.0003 (2)	0.0027 (3)	0.0078 (3)
Sn3	0.0114 (3)	0.0154 (3)	0.0247 (4)	0.0013 (2)	−0.0036 (3)	0.0026 (3)
Sn2	0.0195 (3)	0.0238 (3)	0.0183 (4)	−0.0012 (2)	0.0058 (3)	−0.0072 (3)
Sn7	0.0129 (3)	0.0178 (3)	0.0194 (4)	0.0031 (2)	0.0017 (2)	−0.0013 (3)
Sn1	0.0141 (3)	0.0207 (3)	0.0243 (4)	−0.0038 (2)	0.0054 (3)	0.0000 (3)
O1	0.015 (3)	0.014 (3)	0.019 (4)	−0.004 (2)	0.001 (2)	0.000 (3)
N4	0.023 (4)	0.033 (4)	0.026 (5)	0.000 (3)	0.006 (4)	−0.004 (4)
N3	0.026 (4)	0.021 (4)	0.027 (5)	−0.001 (3)	0.000 (4)	0.001 (4)
N2	0.020 (4)	0.026 (4)	0.025 (5)	0.002 (3)	0.000 (3)	0.001 (4)
N1	0.029 (4)	0.030 (4)	0.034 (6)	−0.007 (4)	−0.007 (4)	0.001 (4)

Geometric parameters (\AA , $^\circ$)

Cs1—N2 ⁱ	3.417 (8)	Sn9—Sn6	2.9367 (8)
Cs1—Sn3 ⁱⁱ	3.8881 (7)	Sn9—Sn2	2.9793 (9)
Cs1—Sn8	3.9609 (7)	Sn9—Cs1 ^{xii}	4.0131 (8)
Cs1—Sn9 ⁱⁱⁱ	4.0132 (8)	Sn9—Cs5 ^{xii}	4.0210 (7)
Cs1—Sn9	4.0723 (7)	Sn9—Cs3 ^{xii}	4.1787 (8)
Cs1—Sn7	4.0843 (8)	Sn6—Sn7	2.9425 (9)
Cs1—Sn3 ⁱⁱⁱ	4.1175 (8)	Sn6—Sn2	2.9449 (8)
Cs1—Sn6	4.2037 (9)	Sn6—Sn5	2.9688 (8)
Cs1—Cs5	4.3213 (8)	Sn6—Cs5 ⁱ	4.0847 (9)
Cs1—Sn1 ⁱⁱ	4.3395 (8)	Sn6—Cs4 ⁱ	4.1507 (8)
Cs5—O1	2.817 (5)	Sn4—Sn1	2.9323 (9)
Cs5—N2 ^{iv}	3.661 (6)	Sn4—Sn7	2.9516 (7)
Cs5—Cs4	3.9951 (7)	Sn4—Sn5	3.1880 (9)
Cs5—Sn9 ⁱⁱⁱ	4.0210 (7)	Sn4—Sn3	3.2457 (8)
Cs5—Sn6 ^v	4.0847 (9)	Sn4—Cs2 ^{vii}	4.0234 (7)
Cs5—Sn3 ⁱⁱ	4.1089 (9)	Sn4—Cs2 ^{xi}	4.1038 (7)
Cs5—Sn4 ⁱⁱ	4.1474 (8)	Sn4—Cs5 ^{xi}	4.1473 (8)
Cs5—Sn8 ⁱⁱ	4.3519 (8)	Sn5—Sn1	2.9434 (8)
Cs5—Cs2	4.3741 (7)	Sn5—Sn7	2.9530 (9)
Cs2—Sn7	4.0045 (7)	Sn5—Sn2	3.1732 (8)

Cs2—Sn4 ^{vi}	4.0235 (7)	Sn5—Cs3 ^{xiii}	4.2463 (8)
Cs2—Sn4 ⁱⁱ	4.1038 (7)	Sn5—Cs4 ^{vii}	4.3400 (8)
Cs2—Cs4	4.1961 (9)	Sn5—Cs2 ^{vii}	4.4459 (8)
Cs2—Sn7 ^{vi}	4.2398 (7)	Sn3—Sn1	2.9301 (8)
Cs2—Sn1 ⁱⁱ	4.2575 (9)	Sn3—Sn2	3.2277 (9)
Cs2—Sn5 ^{vi}	4.4460 (8)	Sn3—Cs1 ^{xi}	3.8882 (7)
Cs2—Cs2 ^{vii}	5.7408 (5)	Sn3—Cs5 ^{xi}	4.1088 (9)
Cs2—Cs2 ^{vi}	5.7408 (5)	Sn3—Cs1 ^{xii}	4.1174 (8)
Cs3—N2 ^{viii}	3.639 (7)	Sn3—Cs3 ^{xii}	4.2017 (8)
Cs3—Sn8	3.9656 (8)	Sn2—Sn1	2.9581 (9)
Cs3—Sn9 ⁱⁱⁱ	4.1786 (8)	Sn2—Cs4 ^{xiii}	4.0580 (8)
Cs3—Sn3 ⁱⁱⁱ	4.2016 (8)	Sn2—Cs3 ^{xii}	4.2103 (7)
Cs3—Sn2 ⁱⁱⁱ	4.2102 (7)	Sn7—Cs2 ^{vii}	4.2398 (7)
Cs3—Sn1 ^{ix}	4.2123 (9)	Sn1—Cs4 ^{xiii}	4.0449 (9)
Cs3—Cs4	4.2445 (7)	Sn1—Cs3 ^{xiii}	4.2122 (9)
Cs3—Sn5 ^{ix}	4.2463 (8)	Sn1—Cs2 ^{xi}	4.2576 (9)
Cs3—Cs4 ^{viii}	4.8028 (7)	Sn1—Cs1 ^{xi}	4.3396 (8)
Cs4—N1	3.292 (8)	O1—H1	0.9500
Cs4—Sn1 ^{ix}	4.0449 (9)	N4—H4A	0.9100
Cs4—Sn2 ^{ix}	4.0579 (8)	N4—H4B	0.9100
Cs4—Sn6 ^v	4.1507 (8)	N4—H4C	0.9100
Cs4—Sn5 ^{vi}	4.3399 (8)	N3—H3A	0.9100
Cs4—Cs3 ^x	4.8027 (7)	N3—H3B	0.9100
Sn8—Sn4	2.9314 (8)	N3—H3C	0.9100
Sn8—Sn3	2.9518 (8)	N2—H2A	0.9100
Sn8—Sn9	2.9658 (9)	N2—H2B	0.9100
Sn8—Sn7	2.9735 (8)	N2—H2C	0.9100
Sn8—Cs5 ^{xi}	4.3518 (8)	N1—H1A	0.9100
Sn8—Cs1 ^{xii}	4.5284 (7)	N1—H1B	0.9100
Sn9—Sn3	2.9310 (8)	N1—H1C	0.9100
N2 ⁱ —Cs1—Sn3 ⁱⁱ	82.78 (11)	Sn4—Sn8—Cs3	133.97 (2)
N2 ⁱ —Cs1—Sn8	107.85 (11)	Sn3—Sn8—Cs3	141.10 (2)
Sn3 ⁱⁱ —Cs1—Sn8	167.198 (19)	Sn9—Sn8—Cs3	120.16 (2)
N2 ⁱ —Cs1—Sn9 ⁱⁱⁱ	98.37 (12)	Sn7—Sn8—Cs3	113.08 (2)
Sn3 ⁱⁱ —Cs1—Sn9 ⁱⁱⁱ	75.913 (15)	Cs1—Sn8—Cs3	67.283 (14)
Sn8—Cs1—Sn9 ⁱⁱⁱ	108.664 (18)	Sn4—Sn8—Cs5 ^{xi}	66.113 (17)
N2 ⁱ —Cs1—Sn9	64.56 (11)	Sn3—Sn8—Cs5 ^{xi}	65.218 (18)
Sn3 ⁱⁱ —Cs1—Sn9	146.35 (2)	Sn9—Sn8—Cs5 ^{xi}	121.53 (2)
Sn8—Cs1—Sn9	43.304 (13)	Sn7—Sn8—Cs5 ^{xi}	123.40 (2)
Sn9 ⁱⁱⁱ —Cs1—Sn9	115.038 (15)	Cs1—Sn8—Cs5 ^{xi}	159.03 (2)
N2 ⁱ —Cs1—Sn7	108.20 (12)	Cs3—Sn8—Cs5 ^{xi}	91.952 (17)
Sn3 ⁱⁱ —Cs1—Sn7	127.309 (17)	Sn4—Sn8—Cs1 ^{xii}	127.17 (2)
Sn8—Cs1—Sn7	43.347 (12)	Sn3—Sn8—Cs1 ^{xii}	62.688 (16)
Sn9 ⁱⁱⁱ —Cs1—Sn7	145.99 (2)	Sn9—Sn8—Cs1 ^{xii}	60.572 (16)
Sn9—Cs1—Sn7	61.588 (12)	Sn7—Sn8—Cs1 ^{xii}	149.81 (2)
N2 ⁱ —Cs1—Sn3 ⁱⁱⁱ	79.70 (12)	Cs1—Sn8—Cs1 ^{xii}	94.875 (13)
Sn3 ⁱⁱ —Cs1—Sn3 ⁱⁱⁱ	110.648 (15)	Cs3—Sn8—Cs1 ^{xii}	83.040 (14)
Sn8—Cs1—Sn3 ⁱⁱⁱ	78.928 (14)	Cs5 ^{xi} —Sn8—Cs1 ^{xii}	79.056 (13)

Sn9 ⁱⁱⁱ —Cs1—Sn3 ⁱⁱⁱ	42.236 (12)	Sn3—Sn9—Sn6	106.16 (2)
Sn9—Cs1—Sn3 ⁱⁱⁱ	72.811 (14)	Sn3—Sn9—Sn8	60.07 (2)
Sn7—Cs1—Sn3 ⁱⁱⁱ	121.949 (15)	Sn6—Sn9—Sn8	90.20 (2)
N2 ⁱ —Cs1—Sn6	66.66 (12)	Sn3—Sn9—Sn2	66.20 (2)
Sn3 ⁱⁱ —Cs1—Sn6	118.956 (19)	Sn6—Sn9—Sn2	59.70 (2)
Sn8—Cs1—Sn6	61.522 (14)	Sn8—Sn9—Sn2	105.39 (2)
Sn9 ⁱⁱⁱ —Cs1—Sn6	155.360 (17)	Sn3—Sn9—Cs1 ^{xii}	70.784 (18)
Sn9—Cs1—Sn6	41.531 (12)	Sn6—Sn9—Cs1 ^{xii}	169.28 (3)
Sn7—Cs1—Sn6	41.560 (13)	Sn8—Sn9—Cs1 ^{xii}	79.36 (2)
Sn3 ⁱⁱⁱ —Cs1—Sn6	113.663 (16)	Sn2—Sn9—Cs1 ^{xii}	125.31 (2)
N2 ⁱ —Cs1—Cs5	138.34 (11)	Sn3—Sn9—Cs5 ^{xii}	128.26 (2)
Sn3 ⁱⁱ —Cs1—Cs5	59.790 (14)	Sn6—Sn9—Cs5 ^{xii}	121.89 (2)
Sn8—Cs1—Cs5	111.923 (17)	Sn8—Sn9—Cs5 ^{xii}	131.32 (2)
Sn9 ⁱⁱⁱ —Cs1—Cs5	57.548 (12)	Sn2—Sn9—Cs5 ^{xii}	121.93 (2)
Sn9—Cs1—Cs5	153.592 (18)	Cs1 ^{xii} —Sn9—Cs5 ^{xii}	65.078 (14)
Sn7—Cs1—Cs5	108.945 (16)	Sn3—Sn9—Cs1	126.40 (2)
Sn3 ⁱⁱⁱ —Cs1—Cs5	96.014 (16)	Sn6—Sn9—Cs1	71.633 (18)
Sn6—Cs1—Cs5	146.084 (16)	Sn8—Sn9—Cs1	66.348 (17)
N2 ⁱ —Cs1—Sn1 ⁱⁱ	84.70 (11)	Sn2—Sn9—Cs1	130.83 (2)
Sn3 ⁱⁱ —Cs1—Sn1 ⁱⁱ	41.268 (12)	Cs1 ^{xii} —Sn9—Cs1	101.571 (16)
Sn8—Cs1—Sn1 ⁱⁱ	130.739 (17)	Cs5 ^{xii} —Sn9—Cs1	88.619 (15)
Sn9 ⁱⁱⁱ —Cs1—Sn1 ⁱⁱ	116.464 (15)	Sn3—Sn9—Cs3 ^{xii}	69.949 (18)
Sn9—Cs1—Sn1 ⁱⁱ	122.702 (19)	Sn6—Sn9—Cs3 ^{xii}	124.49 (3)
Sn7—Cs1—Sn1 ⁱⁱ	87.394 (15)	Sn8—Sn9—Cs3 ^{xii}	125.68 (2)
Sn3 ⁱⁱⁱ —Cs1—Sn1 ⁱⁱ	149.840 (16)	Sn2—Sn9—Cs3 ^{xii}	69.766 (18)
Sn6—Cs1—Sn1 ⁱⁱ	82.772 (15)	Cs1 ^{xii} —Sn9—Cs3 ^{xii}	64.795 (14)
Cs5—Cs1—Sn1 ⁱⁱ	78.830 (14)	Cs5 ^{xii} —Sn9—Cs3 ^{xii}	67.783 (13)
O1—Cs5—N2 ^{iv}	148.09 (15)	Cs1—Sn9—Cs3 ^{xii}	155.890 (17)
O1—Cs5—Cs4	50.21 (11)	Sn9—Sn6—Sn7	90.51 (2)
N2 ^{iv} —Cs5—Cs4	143.27 (13)	Sn9—Sn6—Sn2	60.87 (2)
O1—Cs5—Sn9 ⁱⁱⁱ	84.88 (10)	Sn7—Sn6—Sn2	105.96 (2)
N2 ^{iv} —Cs5—Sn9 ⁱⁱⁱ	63.22 (10)	Sn9—Sn6—Sn5	105.16 (2)
Cs4—Cs5—Sn9 ⁱⁱⁱ	116.228 (16)	Sn7—Sn6—Sn5	59.94 (2)
O1—Cs5—Sn6 ^v	111.48 (12)	Sn2—Sn6—Sn5	64.902 (19)
N2 ^{iv} —Cs5—Sn6 ^v	86.59 (13)	Sn9—Sn6—Cs5 ⁱ	143.95 (3)
Cs4—Cs5—Sn6 ^v	61.811 (14)	Sn7—Sn6—Cs5 ⁱ	124.76 (2)
Sn9 ⁱⁱⁱ —Cs5—Sn6 ^v	121.556 (19)	Sn2—Sn6—Cs5 ⁱ	98.21 (2)
O1—Cs5—Sn3 ⁱⁱ	95.23 (12)	Sn5—Sn6—Cs5 ⁱ	88.99 (2)
N2 ^{iv} —Cs5—Sn3 ⁱⁱ	77.16 (13)	Sn9—Sn6—Cs4 ⁱ	110.94 (2)
Cs4—Cs5—Sn3 ⁱⁱ	139.478 (18)	Sn7—Sn6—Cs4 ⁱ	124.08 (2)
Sn9 ⁱⁱⁱ —Cs5—Sn3 ⁱⁱ	73.429 (15)	Sn2—Sn6—Cs4 ⁱ	129.80 (2)
Sn6 ^v —Cs5—Sn3 ⁱⁱ	149.616 (17)	Sn5—Sn6—Cs4 ⁱ	143.42 (2)
O1—Cs5—Sn4 ⁱⁱ	97.15 (11)	Cs5 ⁱ —Sn6—Cs4 ⁱ	58.034 (13)
N2 ^{iv} —Cs5—Sn4 ⁱⁱ	99.27 (12)	Sn9—Sn6—Cs1	66.836 (19)
Cs4—Cs5—Sn4 ⁱⁱ	109.876 (16)	Sn7—Sn6—Cs1	67.046 (18)
Sn9 ⁱⁱⁱ —Cs5—Sn4 ⁱⁱ	119.695 (19)	Sn2—Sn6—Cs1	127.23 (2)
Sn6 ^v —Cs5—Sn4 ⁱⁱ	113.434 (16)	Sn5—Sn6—Cs1	126.39 (2)
Sn3 ⁱⁱ —Cs5—Sn4 ⁱⁱ	46.295 (12)	Cs5 ⁱ —Sn6—Cs1	129.785 (16)
O1—Cs5—Cs1	45.22 (11)	Cs4 ⁱ —Sn6—Cs1	75.135 (14)

N2 ^{iv} —Cs5—Cs1	110.56 (12)	Sn8—Sn4—Sn1	108.31 (2)
Cs4—Cs5—Cs1	95.417 (14)	Sn8—Sn4—Sn7	60.719 (19)
Sn9 ⁱⁱⁱ —Cs5—Cs1	57.374 (13)	Sn1—Sn4—Sn7	109.03 (3)
Sn6 ^v —Cs5—Cs1	155.179 (17)	Sn8—Sn4—Sn5	100.07 (2)
Sn3 ⁱⁱ —Cs5—Cs1	54.861 (13)	Sn1—Sn4—Sn5	57.31 (2)
Sn4 ⁱⁱ —Cs5—Cs1	82.331 (15)	Sn7—Sn4—Sn5	57.344 (19)
O1—Cs5—Sn8 ⁱⁱ	130.91 (12)	Sn8—Sn4—Sn3	56.818 (17)
N2 ^{iv} —Cs5—Sn8 ⁱⁱ	59.02 (12)	Sn1—Sn4—Sn3	56.350 (19)
Cs4—Cs5—Sn8 ⁱⁱ	145.780 (16)	Sn7—Sn4—Sn3	99.29 (2)
Sn9 ⁱⁱⁱ —Cs5—Sn8 ⁱⁱ	96.897 (15)	Sn5—Sn4—Sn3	89.49 (2)
Sn6 ^v —Cs5—Sn8 ⁱⁱ	108.922 (16)	Sn8—Sn4—Cs2 ^{vii}	125.66 (2)
Sn3 ⁱⁱ —Cs5—Sn8 ⁱⁱ	40.711 (12)	Sn1—Sn4—Cs2 ^{vii}	112.72 (2)
Sn4 ⁱⁱ —Cs5—Sn8 ⁱⁱ	40.262 (11)	Sn7—Sn4—Cs2 ^{vii}	73.050 (17)
Cs1—Cs5—Sn8 ⁱⁱ	95.499 (16)	Sn5—Sn4—Cs2 ^{vii}	75.125 (17)
O1—Cs5—Cs2	43.82 (10)	Sn3—Sn4—Cs2 ^{vii}	164.60 (3)
N2 ^{iv} —Cs5—Cs2	155.66 (13)	Sn8—Sn4—Cs2 ^{xi}	136.64 (2)
Cs4—Cs5—Cs2	59.978 (14)	Sn1—Sn4—Cs2 ^{xi}	72.311 (18)
Sn9 ⁱⁱⁱ —Cs5—Cs2	119.331 (17)	Sn7—Sn4—Cs2 ^{xi}	162.15 (2)
Sn6 ^v —Cs5—Cs2	108.391 (15)	Sn5—Sn4—Cs2 ^{xi}	113.97 (2)
Sn3 ⁱⁱ —Cs5—Cs2	80.651 (15)	Sn3—Sn4—Cs2 ^{xi}	96.036 (17)
Sn4 ⁱⁱ —Cs5—Cs2	57.504 (12)	Cs2 ^{vii} —Sn4—Cs2 ^{xi}	89.873 (12)
Cs1—Cs5—Cs2	62.723 (12)	Sn8—Sn4—Cs5 ^{xi}	73.625 (18)
Sn8 ⁱⁱ —Cs5—Cs2	97.327 (15)	Sn1—Sn4—Cs5 ^{xi}	100.52 (2)
Sn7—Cs2—Sn4 ^{vi}	91.823 (15)	Sn7—Sn4—Cs5 ^{xi}	131.17 (2)
Sn7—Cs2—Sn4 ⁱⁱ	128.598 (19)	Sn5—Sn4—Cs5 ^{xi}	154.56 (2)
Sn4 ^{vi} —Cs2—Sn4 ⁱⁱ	124.596 (16)	Sn3—Sn4—Cs5 ^{xi}	66.228 (17)
Sn7—Cs2—Cs4	100.440 (16)	Cs2 ^{vii} —Sn4—Cs5 ^{xi}	128.909 (19)
Sn4 ^{vi} —Cs2—Cs4	99.106 (17)	Cs2 ^{xi} —Sn4—Cs5 ^{xi}	64.025 (13)
Sn4 ⁱⁱ —Cs2—Cs4	106.844 (17)	Sn1—Sn5—Sn7	108.69 (3)
Sn7—Cs2—Sn7 ^{vi}	133.131 (16)	Sn1—Sn5—Sn6	108.66 (2)
Sn4 ^{vi} —Cs2—Sn7 ^{vi}	41.753 (11)	Sn7—Sn5—Sn6	59.59 (2)
Sn4 ⁱⁱ —Cs2—Sn7 ^{vi}	87.418 (14)	Sn1—Sn5—Sn2	57.697 (19)
Cs4—Cs2—Sn7 ^{vi}	94.530 (17)	Sn7—Sn5—Sn2	100.16 (2)
Sn7—Cs2—Sn1 ⁱⁱ	89.560 (17)	Sn6—Sn5—Sn2	57.184 (18)
Sn4 ^{vi} —Cs2—Sn1 ⁱⁱ	125.124 (19)	Sn1—Sn5—Sn4	56.97 (2)
Sn4 ⁱⁱ —Cs2—Sn1 ⁱⁱ	41.007 (13)	Sn7—Sn5—Sn4	57.300 (19)
Cs4—Cs2—Sn1 ⁱⁱ	134.426 (17)	Sn6—Sn5—Sn4	99.31 (2)
Sn7 ^{vi} —Cs2—Sn1 ⁱⁱ	110.573 (16)	Sn2—Sn5—Sn4	91.23 (2)
Sn7—Cs2—Cs5	109.417 (15)	Sn1—Sn5—Cs3 ^{xiii}	69.015 (19)
Sn4 ^{vi} —Cs2—Cs5	148.679 (19)	Sn7—Sn5—Cs3 ^{xiii}	176.91 (2)
Sn4 ⁱⁱ —Cs2—Cs5	58.471 (13)	Sn6—Sn5—Cs3 ^{xiii}	118.80 (2)
Cs4—Cs2—Cs5	55.525 (13)	Sn2—Sn5—Cs3 ^{xiii}	76.893 (18)
Sn7 ^{vi} —Cs2—Cs5	115.608 (16)	Sn4—Sn5—Cs3 ^{xiii}	121.47 (2)
Sn1 ⁱⁱ —Cs2—Cs5	79.136 (14)	Sn1—Sn5—Cs4 ^{vii}	111.766 (19)
Sn7—Cs2—Sn5 ^{vi}	116.490 (16)	Sn7—Sn5—Cs4 ^{vii}	115.01 (2)
Sn4 ^{vi} —Cs2—Sn5 ^{vi}	43.871 (13)	Sn6—Sn5—Cs4 ^{vii}	138.10 (2)
Sn4 ⁱⁱ —Cs2—Sn5 ^{vi}	114.834 (16)	Sn2—Sn5—Cs4 ^{vii}	144.45 (2)
Cs4—Cs2—Sn5 ^{vi}	60.207 (13)	Sn4—Sn5—Cs4 ^{vii}	111.50 (2)
Sn7 ^{vi} —Cs2—Sn5 ^{vi}	39.663 (12)	Cs3 ^{xiii} —Sn5—Cs4 ^{vii}	68.012 (13)

Sn1 ⁱⁱ —Cs2—Sn5 ^{vi}	149.209 (16)	Sn1—Sn5—Cs2 ^{vii}	102.07 (2)
Cs5—Cs2—Sn5 ^{vi}	104.930 (17)	Sn7—Sn5—Cs2 ^{vii}	66.404 (18)
Sn7—Cs2—Cs1	56.821 (12)	Sn6—Sn5—Cs2 ^{vii}	123.73 (2)
Sn4 ^{vi} —Cs2—Cs1	148.568 (16)	Sn2—Sn5—Cs2 ^{vii}	152.23 (2)
Sn4 ⁱⁱ —Cs2—Cs1	80.342 (13)	Sn4—Sn5—Cs2 ^{vii}	61.004 (16)
Cs4—Cs2—Cs1	89.708 (14)	Cs3 ^{xiii} —Sn5—Cs2 ^{vii}	115.845 (16)
Sn7 ^{vi} —Cs2—Cs1	167.741 (16)	Cs4 ^{vii} —Sn5—Cs2 ^{vii}	57.042 (13)
Sn1 ⁱⁱ —Cs2—Cs1	59.123 (12)	Sn1—Sn3—Sn9	109.13 (3)
Cs5—Cs2—Cs1	58.068 (11)	Sn1—Sn3—Sn8	107.82 (2)
Sn5 ^{vi} —Cs2—Cs1	148.656 (18)	Sn9—Sn3—Sn8	60.55 (2)
Sn7—Cs2—Cs2 ^{vii}	47.576 (10)	Sn1—Sn3—Sn2	57.17 (2)
Sn4 ^{vi} —Cs2—Cs2 ^{vii}	45.631 (12)	Sn9—Sn3—Sn2	57.62 (2)
Sn4 ⁱⁱ —Cs2—Cs2 ^{vii}	157.83 (2)	Sn8—Sn3—Sn2	99.76 (2)
Cs4—Cs2—Cs2 ^{vii}	95.020 (15)	Sn1—Sn3—Sn4	56.415 (19)
Sn7 ^{vi} —Cs2—Cs2 ^{vii}	87.268 (15)	Sn9—Sn3—Sn4	98.90 (2)
Sn1 ⁱⁱ —Cs2—Cs2 ^{vii}	122.60 (2)	Sn8—Sn3—Sn4	56.218 (17)
Cs5—Cs2—Cs2 ^{vii}	142.091 (16)	Sn2—Sn3—Sn4	89.22 (2)
Sn5 ^{vi} —Cs2—Cs2 ^{vii}	72.807 (14)	Sn1—Sn3—Cs1 ^{xi}	77.654 (18)
Cs1—Cs2—Cs2 ^{vii}	103.840 (12)	Sn9—Sn3—Cs1 ^{xi}	157.53 (2)
Sn7—Cs2—Cs2 ^{vi}	146.38 (2)	Sn8—Sn3—Cs1 ^{xi}	139.24 (3)
Sn4 ^{vi} —Cs2—Cs2 ^{vi}	80.443 (14)	Sn2—Sn3—Cs1 ^{xi}	115.45 (2)
Sn4 ⁱⁱ —Cs2—Cs2 ^{vi}	44.495 (8)	Sn4—Sn3—Cs1 ^{xi}	102.444 (18)
Cs4—Cs2—Cs2 ^{vi}	113.053 (17)	Sn1—Sn3—Cs5 ^{xi}	101.43 (2)
Sn7 ^{vi} —Cs2—Cs2 ^{vi}	44.205 (11)	Sn9—Sn3—Cs5 ^{xi}	130.87 (2)
Sn1 ⁱⁱ —Cs2—Cs2 ^{vi}	69.422 (13)	Sn8—Sn3—Cs5 ^{xi}	74.07 (2)
Cs5—Cs2—Cs2 ^{vi}	92.580 (11)	Sn2—Sn3—Cs5 ^{xi}	155.51 (2)
Sn5 ^{vi} —Cs2—Cs2 ^{vi}	79.856 (14)	Sn4—Sn3—Cs5 ^{xi}	67.477 (17)
Cs1—Cs2—Cs2 ^{vi}	123.659 (15)	Cs1 ^{xi} —Sn3—Cs5 ^{xi}	65.349 (14)
Cs2 ^{vii} —Cs2—Cs2 ^{vi}	123.070 (17)	Sn1—Sn3—Cs1 ^{xii}	170.99 (3)
N2 ^{viii} —Cs3—Sn8	63.17 (13)	Sn9—Sn3—Cs1 ^{xii}	66.980 (17)
N2 ^{viii} —Cs3—Sn9 ⁱⁱⁱ	115.20 (10)	Sn8—Sn3—Cs1 ^{xii}	77.744 (18)
Sn8—Cs3—Sn9 ⁱⁱⁱ	105.364 (18)	Sn2—Sn3—Cs1 ^{xii}	115.47 (2)
N2 ^{viii} —Cs3—Sn3 ⁱⁱⁱ	75.92 (11)	Sn4—Sn3—Cs1 ^{xii}	131.33 (2)
Sn8—Cs3—Sn3 ⁱⁱⁱ	77.873 (16)	Cs1 ^{xi} —Sn3—Cs1 ^{xii}	102.944 (15)
Sn9 ⁱⁱⁱ —Cs3—Sn3 ⁱⁱⁱ	40.943 (12)	Cs5 ^{xi} —Sn3—Cs1 ^{xii}	86.825 (17)
N2 ^{viii} —Cs3—Sn2 ⁱⁱⁱ	87.77 (10)	Sn1—Sn3—Cs3 ^{xii}	107.44 (2)
Sn8—Cs3—Sn2 ⁱⁱⁱ	121.638 (18)	Sn9—Sn3—Cs3 ^{xii}	69.109 (18)
Sn9 ⁱⁱⁱ —Cs3—Sn2 ⁱⁱⁱ	41.602 (12)	Sn8—Sn3—Cs3 ^{xii}	125.34 (2)
Sn3 ⁱⁱⁱ —Cs3—Sn2 ⁱⁱⁱ	45.128 (14)	Sn2—Sn3—Cs3 ^{xii}	67.578 (17)
N2 ^{viii} —Cs3—Sn1 ^{ix}	99.02 (13)	Sn4—Sn3—Cs3 ^{xii}	156.79 (2)
Sn8—Cs3—Sn1 ^{ix}	126.998 (17)	Cs1 ^{xi} —Sn3—Cs3 ^{xii}	88.437 (15)
Sn9 ⁱⁱⁱ —Cs3—Sn1 ^{ix}	126.514 (18)	Cs5 ^{xi} —Sn3—Cs3 ^{xii}	135.489 (17)
Sn3 ⁱⁱⁱ —Cs3—Sn1 ^{ix}	149.810 (19)	Cs1 ^{xii} —Sn3—Cs3 ^{xii}	63.713 (14)
Sn2 ⁱⁱⁱ —Cs3—Sn1 ^{ix}	105.654 (18)	Sn6—Sn2—Sn1	108.91 (2)
N2 ^{viii} —Cs3—Cs4	136.56 (10)	Sn6—Sn2—Sn9	59.43 (2)
Sn8—Cs3—Cs4	100.445 (16)	Sn1—Sn2—Sn9	107.09 (3)
Sn9 ⁱⁱⁱ —Cs3—Cs4	107.813 (15)	Sn6—Sn2—Sn5	57.914 (18)
Sn3 ⁱⁱⁱ —Cs3—Cs4	143.281 (17)	Sn1—Sn2—Sn5	57.249 (18)
Sn2 ⁱⁱⁱ —Cs3—Cs4	131.129 (17)	Sn9—Sn2—Sn5	99.29 (2)

Sn1 ^{ix} —Cs3—Cs4	57.148 (13)	Sn6—Sn2—Sn3	98.82 (2)
N2 ^{viii} —Cs3—Sn5 ^{ix}	58.32 (13)	Sn1—Sn2—Sn3	56.34 (2)
Sn8—Cs3—Sn5 ^{ix}	101.741 (16)	Sn9—Sn2—Sn3	56.183 (19)
Sn9 ⁱⁱⁱ —Cs3—Sn5 ^{ix}	143.904 (18)	Sn5—Sn2—Sn3	90.07 (2)
Sn3 ⁱⁱⁱ —Cs3—Sn5 ^{ix}	126.547 (16)	Sn6—Sn2—Cs4 ^{xiii}	164.74 (3)
Sn2 ⁱⁱⁱ —Cs3—Sn5 ^{ix}	103.266 (17)	Sn1—Sn2—Cs4 ^{xiii}	68.353 (18)
Sn1 ^{ix} —Cs3—Sn5 ^{ix}	40.724 (12)	Sn9—Sn2—Cs4 ^{xiii}	135.78 (2)
Cs4—Cs3—Sn5 ^{ix}	89.967 (15)	Sn5—Sn2—Cs4 ^{xiii}	111.62 (2)
N2 ^{viii} —Cs3—Cs1	107.90 (13)	Sn3—Sn2—Cs4 ^{xiii}	91.928 (19)
Sn8—Cs3—Cs1	56.307 (13)	Sn6—Sn2—Cs3 ^{xii}	123.22 (2)
Sn9 ⁱⁱⁱ —Cs3—Cs1	55.779 (13)	Sn1—Sn2—Cs3 ^{xii}	106.66 (2)
Sn3 ⁱⁱⁱ —Cs3—Cs1	57.211 (13)	Sn9—Sn2—Cs3 ^{xii}	68.632 (17)
Sn2 ⁱⁱⁱ —Cs3—Cs1	92.782 (15)	Sn5—Sn2—Cs3 ^{xii}	157.36 (3)
Sn1 ^{ix} —Cs3—Cs1	147.903 (16)	Sn3—Sn2—Cs3 ^{xii}	67.296 (17)
Cs4—Cs3—Cs1	90.915 (15)	Cs4 ^{xiii} —Sn2—Cs3 ^{xii}	70.996 (14)
Sn5 ^{ix} —Cs3—Cs1	157.780 (18)	Sn6—Sn7—Sn4	105.59 (2)
N2 ^{viii} —Cs3—Cs5	164.84 (13)	Sn6—Sn7—Sn5	60.47 (2)
Sn8—Cs3—Cs5	106.815 (17)	Sn4—Sn7—Sn5	65.36 (2)
Sn9 ⁱⁱⁱ —Cs3—Cs5	54.469 (11)	Sn6—Sn7—Sn8	89.94 (2)
Sn3 ⁱⁱⁱ —Cs3—Cs5	91.162 (14)	Sn4—Sn7—Sn8	59.306 (18)
Sn2 ⁱⁱⁱ —Cs3—Cs5	88.612 (13)	Sn5—Sn7—Sn8	104.72 (2)
Sn1 ^{ix} —Cs3—Cs5	96.134 (15)	Sn6—Sn7—Cs2	118.88 (2)
Cs4—Cs3—Cs5	53.719 (11)	Sn4—Sn7—Cs2	135.04 (2)
Sn5 ^{ix} —Cs3—Cs5	136.804 (17)	Sn5—Sn7—Cs2	143.35 (2)
Cs1—Cs3—Cs5	57.588 (12)	Sn8—Sn7—Cs2	111.92 (2)
N2 ^{viii} —Cs3—Cs4 ^{viii}	43.41 (12)	Sn6—Sn7—Cs1	71.394 (18)
Sn8—Cs3—Cs4 ^{viii}	104.556 (15)	Sn4—Sn7—Cs1	125.38 (2)
Sn9 ⁱⁱⁱ —Cs3—Cs4 ^{viii}	93.062 (13)	Sn5—Sn7—Cs1	131.21 (2)
Sn3 ⁱⁱⁱ —Cs3—Cs4 ^{viii}	71.279 (13)	Sn8—Sn7—Cs1	66.117 (17)
Sn2 ⁱⁱⁱ —Cs3—Cs4 ^{viii}	53.023 (12)	Cs2—Sn7—Cs1	68.033 (13)
Sn1 ^{ix} —Cs3—Cs4 ^{viii}	84.558 (15)	Sn6—Sn7—Cs2 ^{vii}	131.71 (2)
Cs4—Cs3—Cs4 ^{viii}	141.674 (15)	Sn4—Sn7—Cs2 ^{vii}	65.197 (16)
Sn5 ^{ix} —Cs3—Cs4 ^{viii}	56.920 (12)	Sn5—Sn7—Cs2 ^{vii}	73.933 (18)
Cs1—Cs3—Cs4 ^{viii}	127.162 (15)	Sn8—Sn7—Cs2 ^{vii}	117.69 (2)
Cs5—Cs3—Cs4 ^{viii}	139.627 (15)	Cs2—Sn7—Cs2 ^{vii}	88.220 (12)
N1—Cs4—Cs5	111.82 (14)	Cs1—Sn7—Cs2 ^{vii}	154.315 (19)
N1—Cs4—Sn1 ^{ix}	107.34 (13)	Sn3—Sn1—Sn4	67.23 (2)
Cs5—Cs4—Sn1 ^{ix}	108.886 (17)	Sn3—Sn1—Sn5	100.91 (2)
N1—Cs4—Sn2 ^{ix}	66.34 (14)	Sn4—Sn1—Sn5	65.72 (2)
Cs5—Cs4—Sn2 ^{ix}	135.927 (17)	Sn3—Sn1—Sn2	66.48 (2)
Sn1 ^{ix} —Cs4—Sn2 ^{ix}	42.824 (13)	Sn4—Sn1—Sn2	101.03 (2)
N1—Cs4—Sn6 ^v	165.43 (14)	Sn5—Sn1—Sn2	65.05 (2)
Cs5—Cs4—Sn6 ^v	60.155 (14)	Sn3—Sn1—Cs4 ^{xiii}	96.83 (2)
Sn1 ^{ix} —Cs4—Sn6 ^v	87.136 (17)	Sn4—Sn1—Cs4 ^{xiii}	163.88 (2)
Sn2 ^{ix} —Cs4—Sn6 ^v	128.14 (2)	Sn5—Sn1—Cs4 ^{xiii}	117.52 (3)
N1—Cs4—Cs2	55.63 (14)	Sn2—Sn1—Cs4 ^{xiii}	68.824 (19)
Cs5—Cs4—Cs2	64.497 (14)	Sn3—Sn1—Cs3 ^{xiii}	145.08 (2)
Sn1 ^{ix} —Cs4—Cs2	150.248 (18)	Sn4—Sn1—Cs3 ^{xiii}	130.33 (2)
Sn2 ^{ix} —Cs4—Cs2	120.324 (18)	Sn5—Sn1—Cs3 ^{xiii}	70.26 (2)

Sn6 ^v —Cs4—Cs2	110.600 (16)	Sn2—Sn1—Cs3 ^{xiii}	79.59 (2)
N1—Cs4—Cs3	83.55 (13)	Cs4 ^{xiii} —Sn1—Cs3 ^{xiii}	61.826 (14)
Cs5—Cs4—Cs3	67.362 (13)	Sn3—Sn1—Cs2 ^{xi}	97.98 (2)
Sn1 ^{ix} —Cs4—Cs3	61.026 (14)	Sn4—Sn1—Cs2 ^{xi}	66.681 (18)
Sn2 ^{ix} —Cs4—Cs3	68.737 (13)	Sn5—Sn1—Cs2 ^{xi}	115.64 (2)
Sn6 ^v —Cs4—Cs3	102.670 (15)	Sn2—Sn1—Cs2 ^{xi}	163.63 (3)
Cs2—Cs4—Cs3	91.084 (16)	Cs4 ^{xiii} —Sn1—Cs2 ^{xi}	120.338 (17)
N1—Cs4—Sn5 ^{vi}	63.77 (13)	Cs3 ^{xiii} —Sn1—Cs2 ^{xi}	116.465 (16)
Cs5—Cs4—Sn5 ^{vi}	114.035 (17)	Sn3—Sn1—Cs1 ^{xi}	61.077 (16)
Sn1 ^{ix} —Cs4—Sn5 ^{vi}	136.305 (18)	Sn4—Sn1—Cs1 ^{xi}	98.27 (2)
Sn2 ^{ix} —Cs4—Sn5 ^{vi}	104.233 (16)	Sn5—Sn1—Cs1 ^{xi}	160.44 (2)
Sn6 ^v —Cs4—Sn5 ^{vi}	107.003 (15)	Sn2—Sn1—Cs1 ^{xi}	109.90 (2)
Cs2—Cs4—Sn5 ^{vi}	62.751 (14)	Cs4 ^{xiii} —Sn1—Cs1 ^{xi}	74.730 (14)
Cs3—Cs4—Sn5 ^{vi}	145.75 (2)	Cs3 ^{xiii} —Sn1—Cs1 ^{xi}	128.664 (17)
N1—Cs4—Cs3 ^x	69.42 (14)	Cs2 ^{xi} —Sn1—Cs1 ^{xi}	63.520 (13)
Cs5—Cs4—Cs3 ^x	167.984 (17)	Cs5—O1—H1	180.0
Sn1 ^{ix} —Cs4—Cs3 ^x	81.400 (14)	H4A—N4—H4B	109.5
Sn2 ^{ix} —Cs4—Cs3 ^x	55.981 (12)	H4A—N4—H4C	109.5
Sn6 ^v —Cs4—Cs3 ^x	115.700 (17)	H4B—N4—H4C	109.5
Cs2—Cs4—Cs3 ^x	109.695 (15)	H3A—N3—H3B	109.5
Cs3—Cs4—Cs3 ^x	124.270 (12)	H3A—N3—H3C	109.5
Sn5 ^{vi} —Cs4—Cs3 ^x	55.068 (12)	H3B—N3—H3C	109.5
Sn4—Sn8—Sn3	66.964 (19)	H2A—N2—H2B	109.5
Sn4—Sn8—Sn9	105.62 (2)	H2A—N2—H2C	109.5
Sn3—Sn8—Sn9	59.38 (2)	H2B—N2—H2C	109.5
Sn4—Sn8—Sn7	59.975 (18)	Cs4—N1—H1A	109.5
Sn3—Sn8—Sn7	105.81 (2)	Cs4—N1—H1B	109.5
Sn9—Sn8—Sn7	89.35 (2)	H1A—N1—H1B	109.5
Sn4—Sn8—Cs1	130.47 (2)	Cs4—N1—H1C	109.5
Sn3—Sn8—Cs1	129.70 (2)	H1A—N1—H1C	109.5
Sn9—Sn8—Cs1	70.347 (17)	H1B—N1—H1C	109.5
Sn7—Sn8—Cs1	70.536 (17)		

Symmetry codes: (i) $-x+3/2, -y+1, z+1/2$; (ii) $x+1, y, z$; (iii) $x+1/2, -y+3/2, -z+1$; (iv) $-x+2, y+1/2, -z+1/2$; (v) $-x+3/2, -y+1, z-1/2$; (vi) $x+1/2, -y+1/2, -z+1$; (vii) $x-1/2, -y+1/2, -z+1$; (viii) $-x+1, y+1/2, -z+1/2$; (ix) $-x+1/2, -y+1, z-1/2$; (x) $-x+1, y-1/2, -z+1/2$; (xi) $x-1, y, z$; (xii) $x-1/2, -y+3/2, -z+1$; (xiii) $-x+1/2, -y+1, z+1/2$.